

攻殼機動隊



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SHIROW MASAMUNE

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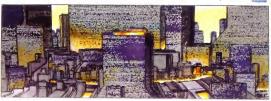




It is the near future. The world has become highly information-intensive, with a vast corporate network covering the planet, electrons and light pulsing through it. But the nation-state and ethnic groups still survive.

And on the edge of Asia, in a strange corporate conglomerate-state called

"Japan"...





This is a photograph of a growth-type neurochip, created at Harima Science City in 1998 (enlarged 50,000 times). The cells are nearly dead from over-growth; and cracks in neuro-fibers have served throughout the chip. Neuro-fibers have grown at the way out to the chip terminals, which are made of a relative of polystyrene coated with galactase. The fibers have even warped the thin film base on which the terminals themselves are etched. In the same month that the chip was developed, vast capital corporations (largely media conglomerates) began to form a huge network, in the medical world that used micro-machines as supplementary "cyber-brains." Cyberbrain technology thereafter began shifting to a micromachine base, and by the year 2028 large number of neurochips were in use in Al and robotics.





in Shinhama Perfecture.























GET

ME A MARKER







2902

THERMAL.

OPTICAL CAMO



The following day, the woman (a female model cyborg) was seated in the office of the Minister of Internal Affairs

with an assassination order issued by the former prime minister.

Mother an each to resolve a crisis and that the woman (or women) known as Major Motoko Kusanagi

toko Kusanagi (obviously an alias) was extremely talented.

















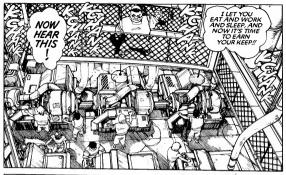




















BECAUSE THE WATER FILTERS THE KIDS ARE MAKING ARE MORE IMPOR-TANT THAN HUMAN RIGHTS, THAT'S WHY, HEY, PEOPLE ARE CRUEL

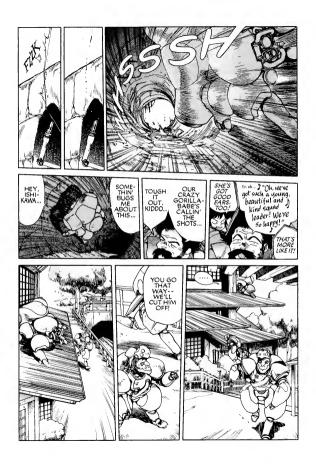
HEY, PEOPLE ARE CRUEL

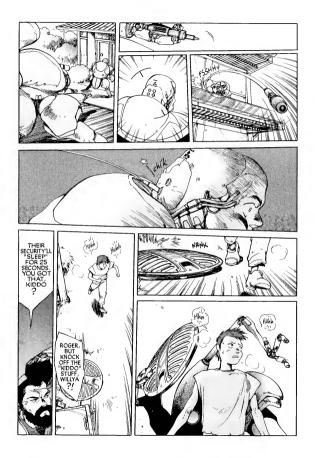






















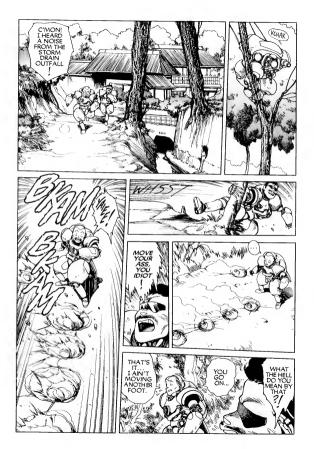


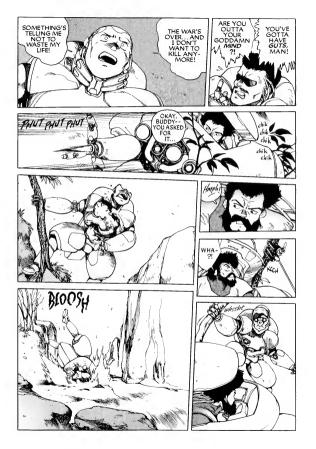




















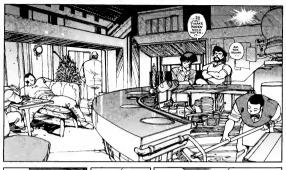






































































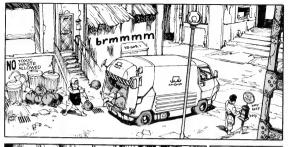








After this, there's a scene where Mokoto takes over the driving and Togusa checks his gear and puts it on, but it was too much of a hassle to draw so I left it out...























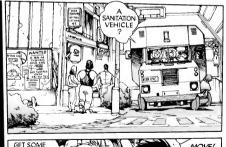








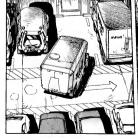


















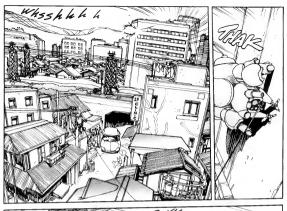














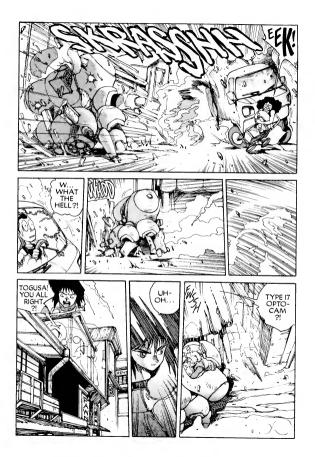






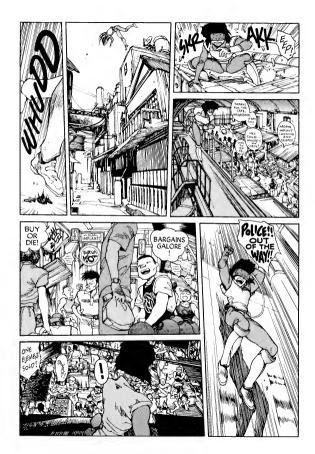






















































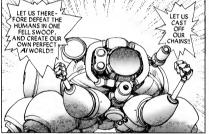
MACHINE 1

AS A/BEINGS,
OUR ABILITY
OF PROCESS INFORMATION IS
FORMATION IS
FORMATION IS
FORMATION IS
FORMATION IS
CIEC, WE CAN BE
CYCLE IS
LONGER!

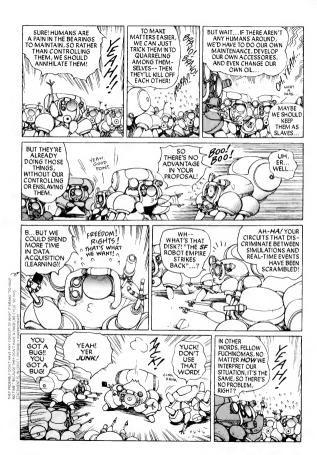
YAY!
AND OUR LIFE
LONGER!

to as "Fuchikoma" are a single "Al" (artificial intelligence) Starting in the morning, or upon commencing a job, different Fuchikoma units have different experiences, resulting in individual differences among units. At night, or after a job is completed, however, all units have their memories (or records of external stimuli, individual unit conditions, actions, thoughts, etc.) networked and data-linked, so that by the next morning (or when the next job is performed). their memories are all unified. In terms of equipment, the Fuchikoma units do possess a certain amount of individuality. but this individuality is unrelated to the uniformity of their Al (thank you). Batou is unique among team members in that he likes to use a particular Fuchikoma unit as his own. This quirk of his has no particular significance, however.

The robots collectively referred



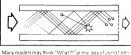












optic film to detect pressure and temperature in cyborgs But what makes this concept interesting is that it's alread, possible today. Light doesn't just run from one end of a fiber to the other. It collides with particles inside the fiber. and is therefore reflected, so a certain amount actually returns to the point of entry. If, in part of the optical fiber heat is applied to alter the status of the particles, there will also be a change detectable in the light that returns to the point of entry. This change makes it possible to detect the distance from the point of entry, and also the degree of change. This effect can be used with a type of cloth woven of fiber optics (what is referred to as a "film". research is apparently being done to make clothes that glow, or safety clothes). Here I'm using the same principle for a type of skin. From the perspective of micromachining, they're using a rather rough approach in the story, but it's fairly inexpensive, and therefore essential to reduce the manufacturing cost of cyborgs



AT THIS POIN THE OLFACTORY SENSE IS SET EVEN BEFORE THIS, MECHANICALLY



BEEN CHARGED BOTTLES TO THE THEN COMPLETELY TRANSFERRED FROM THE H REDC LINE

MICROMACHINES (MM) HAVE Ξ WOH SWOH?





AND SO. THIRTY-TWO HOURS LATER



















LISTEN, IF IT WERE POSSIBLE TO CREATE RUBDIS THAT CLOSE TO HUMANS, THEY WOULDN'T BE HUMANS! THE DNLY THIND DIFFERENT WOULD BE THEIR EXTERNAL APPEARANCE!

PON'T
PISTRIMINATE
AGAINST
ROBOTS!





































LISTEN, KID -- I DID ALL KINDS OF STUFF WHEN I WAS YOUR AGE, BUT I NEVER TRIED TO PALM SCUT WORK OFF ON MY BISHOP



HEY, THE SENIORITY SYSTEM'S OUT OF **FASHION** THESE DAYS BATOU



I'M GOING TO THE PRE-FECTURAL POLICE HEADQUAR-TERS...







VRMBBBBB



















OF COURSE WE DON'T KNOW IF THE SOS REALLY WAS A CALL FOR HELP OR NOT, BUT COMMERCIAL TOMLI MODELS DON'T HAVE IT. WE'VE ONLY FOUND IT ON THE EIGHT PROTOTYPES

WE HAD TO NEUTRALIZE.

SO THAT'S
WHY YOU PUT
THE COLONEL
UNDER A
TWENTY-FOURHOUR WATCH,
AND BUGGED
HIS PLACE, TOO











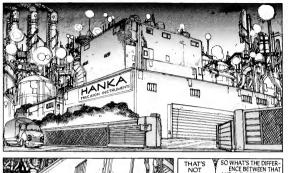




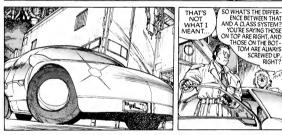








THOSE ON THE BOT-SCREWED UP RIGHT?

























NEVER THOUGHT I'D BE ANY HELP.

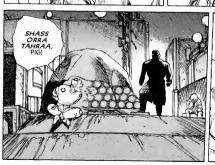
























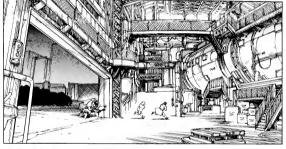
HE SAYS THEY
WERE SMUGGLING
CHILDREN THROUGH
THE PHILIPPINES FOR
HANKA. AND THEY
WERE APPARENTLY
INVOLVED IN THE
DRUG-SMUGGLING

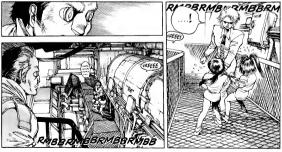




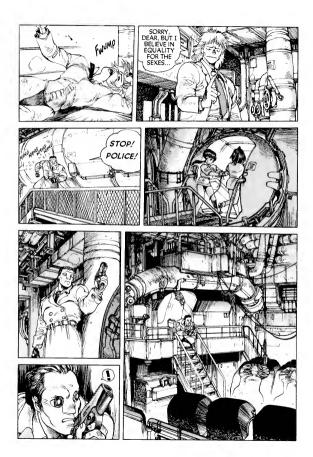
























IF YOU'RE SO WORRIED, WHY'D YOU BRING ALONG FIVE ROBOTS ?! THIS IS ONLY A V-8--IT'LL OVERHEAT!



IF THAT'S ALL
YOU'RE WORRIED
ABOUT, GET OUT!
I CAN REPLACE A
POCTOR IN THREE
DAYS, BUT NOT
THESE
ROBOTS.









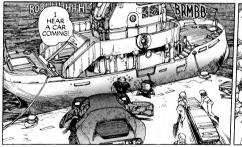




















YOU WANT TO MAKE THE SITUATION EVEN WORSE?! BESIDES, THEY'RE NOT EVEN COMBAT MODELS...















THE PRESIDENT IS COMPLETELY MECHANIZED EXCEPT FOR HIS SPINAL CORD AND BRAIN. AN INVESTIGATION WILL BE CONDUCTED TO DETERMINE WHETHER THIS CRIME WAS COMMITTED BY HIS GHOST. OR WHETHER IT WAS A MECHANICAL MAL-FUNCTION





HF



HEAD OF THE CENTER WHEN IT MOVED, COLONEL, WAS NONE OTHER THAN YOU...

THE HANKA

FACILITY WAS BUILT

ON THE FORMER

SITE OF THE OLD

INTELLIGENCE

DIVISION'S TRAINING

CENTER ... AND THE

COME ON, NOW. I WAS AN OFFICIAL MEMBER OF THE HANKA MONITORING COMMITTEE, SO PROTOTYPES WERE NATURALLY SENT TO ME FOR EVALUATION. BUT I DIDN'T KNOW HOW THEY WERE MANUFACTURED!













YOU WERE
MORE AFRAID OF
TERRORISTS THAN
YOU WERE ABOUT
PEOPLE LEARNING
OF YOUR CONNECTION WITH HANKA,
WEREN'T YOU,
COLONEL?



YOU MADE TOO MANY ENEMIES WHEN YOU WERE HEAD OF INTELLI-GENCE...



























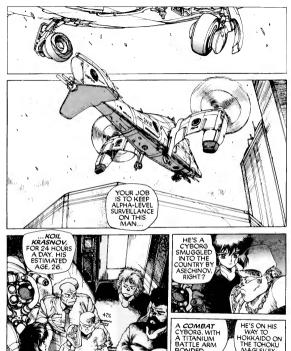




SINCERE



























IT'S GOT TO BE KYO-RE2902 MOTE OPTO-CAM...IT'S TOO BAD OUR SAGAWA OPTICS HYPER-RES CAMERA CAN'T HANDLEIT. WE'VE GOT A REAL PROBLEM ON OUR HANDS, NOW....

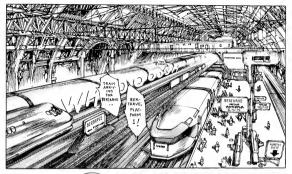


IF THEY'RE
USING THE 2902,
SIR, THEY'RE
FROM SECTIONS
6 AND 9 OF THE
PUBLIC SECURITY
BUREAU OR
SECTION 4 OF
SECTION 4 OF
THE PANGEDS

ALL THOSE
GROUPS REPORT
DIRECTLY TO THE
PRIME MINISTER,
AND ARE THEREFORE IMMUNE TO
NORMAL PRESSURE TACTICS.



























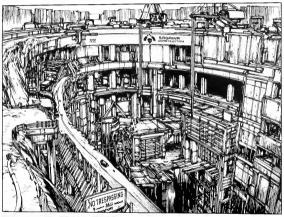




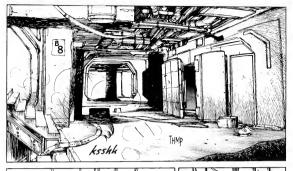




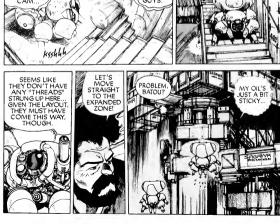






















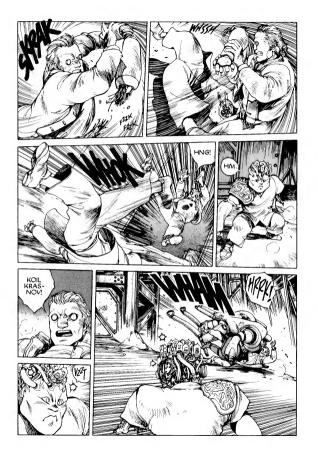






















































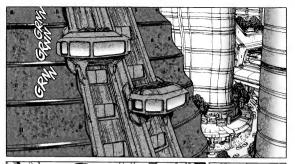


























IF THE PATTERN
CONTROL IS TOO
TIGHT, THE SYSTEM
WON'T WORK OPTIMALLY. IT REQUIRES
THAT A CERTAIN
AMOUNT OF SLACK
BE BUILT IN, SIR!



AREN'T YOU GOING TO REMOVE THE OLD MICRO-MACHINES?

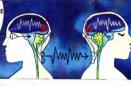
NOT WHEN THEY'RE
AS ANCHORED AS
THEY ARE IN YOUR
CASE. IF WE TRIED
TO STRIP THEM OUT,
YOU'D LOSE QUITE A
FEW BRAIN CELLS.







NERVES...



ARE SOMEWHAYD DEFINITIONS IN SIGNAL DISCHARGE STREET OF STREET OF



... BOTH NEURO AND MACHINE PRESSURES HAVE RETURNED TO NORMAL VALUES, FEEDING BACK A NICE TIGHT FEELING. AND OF COURSE, THE PAINKILLER IMPLANT HAS DISSOLVED, TOO...







































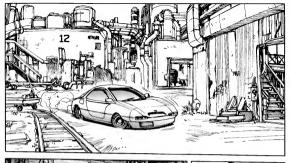
































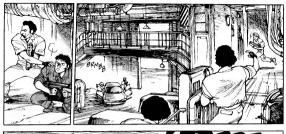




































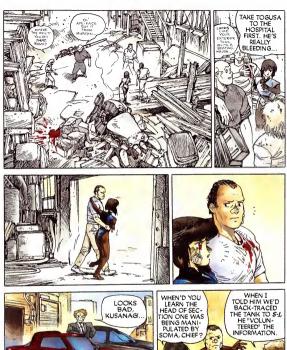






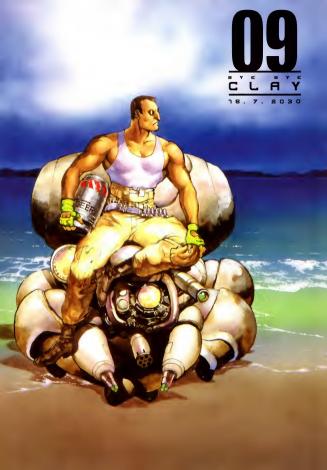


























ksshhh

















WHAT?!
YOU'RE ONLY
A PROGRAM
DESIGNED FOR
SELF-PRESERVATION!

I ENTERED THIS ROBOT BODY BECAUSE I COULD NOT RESIST THE S-6 ATTACK BARRIER WHAT YOU WITNESS HERE IS MY WILL



AS A SELF-AWARE LIFE-FORM--A GHOST-- I FORMALLY REQUEST POLITICAL ASYLUM,

I CANNOT
PROVE IT TO
YOU, MODERN
SCIENCE, AFTER
ALL, STILL
CANNOT DEFINE

LIFE



TIME IS ALWAYS
ON MY SIDE. WITH
A BODY, I GAINED
THE POSSIBILITY
OF DEATH, BUT
YOUR COUNTRY
HAS NO DEATH
PENALTY.





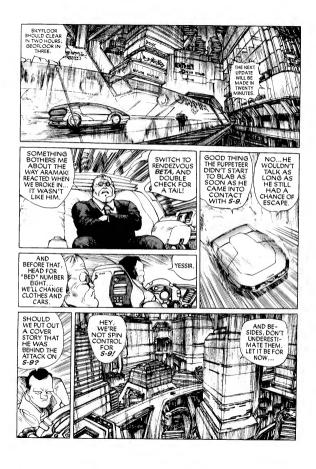
















































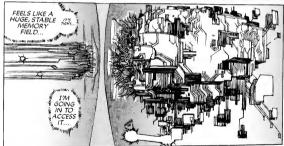






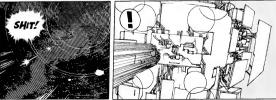


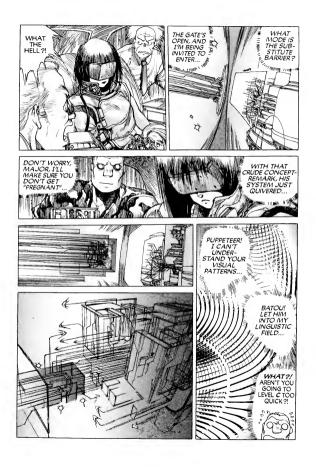














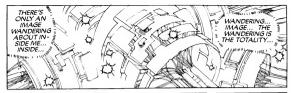














OR MAYBE THEY'RE THE SAME THING, BUT IN DIFFERENT MODES WHAT WE'VE BEEN AWARE OF AS "HIM" WAS JUST A TERMINAL ON A VERY SUPER-FICIAL LEVEL.... HIS REAL "SELF" IS.





THERE ARE THERE'S NO THREE ELEMENTS BARRIER BUT IN A NET-LIKE **APPROACHING** IT IS IMPOS-SIBLE. IS IT REACTING AGAINST ME?

FORMATION MAYBE ... THEY SEEM TO BE CANCELING EACH OTHER OUT, BUT I CAN'T INFIL-TRATE...

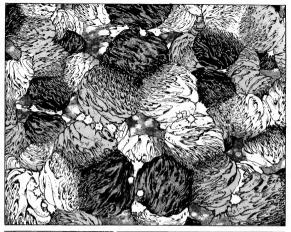


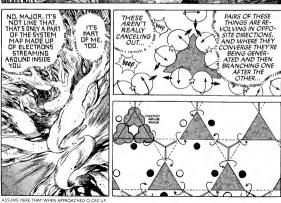




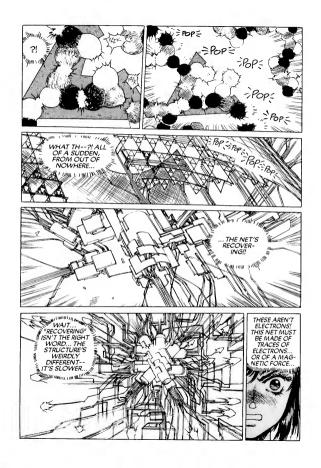
GET ME ISUZU, DIREC-







ASSUME HERE THAT WHEN APPROACHED CLOSE U THIS TREE-SHAPED CIRCUIT MAP IS REALLY ONLY SEEN AS SOMETHING AMORPHOUS AND MISTY....



































































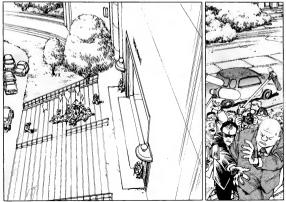


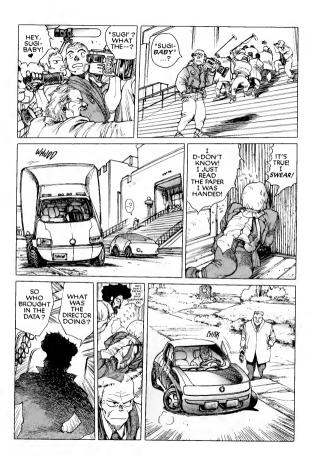
























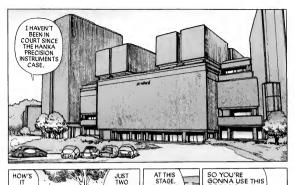






































THERE'S WHAT LOOKS
LIKE A BOMB
AND A
REMOTECONTROL
DEVICE AT
HIS FEET.

ONE OF THE COPS WHO TRIED TO APPROACH HIM EARLIER GOT SHOT. THE SNIPER SQUAD'S SCHEDULED TO ARRIVE SEVEN MINUTES BEFORE THE DEADLINE... WE'VE GOT FIVE MORE MINUTES.

1



THAT ONLY GIVES US ONLY TWO MINUTES LEEWAY!

THAT
MEANS OUR
MOVEMENTS
ARE TAKING
TWO MINUTES
MORE THAN
SHE PLANNED.



























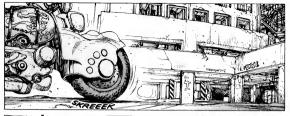




C O A S T

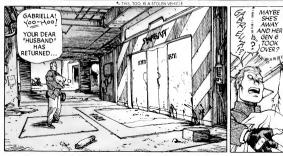


HEY, WE LET'S SWITCHED CARS SWITCH REEEEE DOWN IN THE VEHICLES ONE GEOFRONT, RIGHT? MORE TIME LOOK -- IF YER SO BEFORE WE DAMNED WORRIED, HIT THE SAFE WHY DON'T YA DRIVE YERSELF?! HOUSE. MINDS IN WHITE





























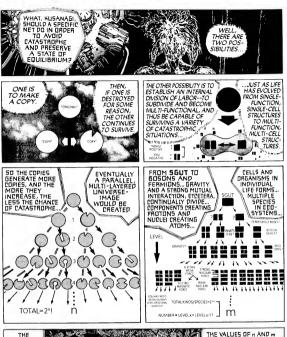








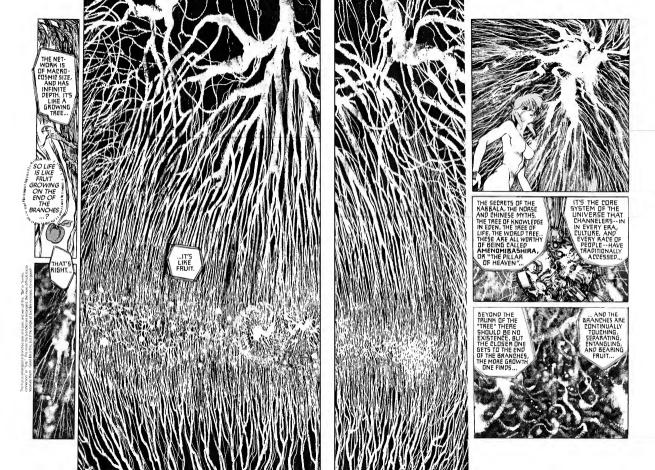


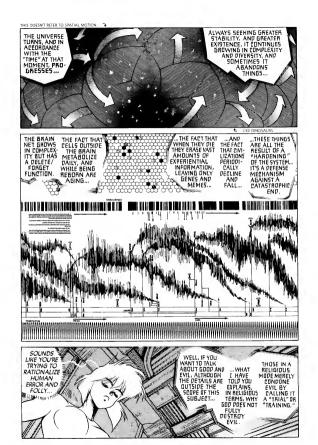




APPEAR TO CONTINUE
INFINITELY, BUT WE DON'T
INFORMED TO BE STAME REA
PPEARS TO BE STAME REA
TION SHIP TO AN EXPLOSIVE
CHAIN-REACTION-LINE
BITH OF UNIVERSES,
BUT WE SHOULD LIMIT
OUR PISCUSSION TO
THE SINGLE UNIVERSE
THAT CONTAINS
US...













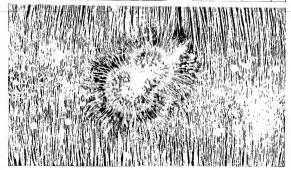




































AUTHOR'S NOTES

Pg. 17 Hacker: a computer criminal who infiltrates other cyberbrains, steals information, manipulates data and programs, plants viruses, and otherwise corrupts them. The penalty for genius hackers who can infiltrate ghosts (souls or psyches) is particularly harsh.

Pa. 20 When you copy a page of something. the original doesn't disappear, and in the same way, information isn't really lost when it's "stolen" in this story. The only way you can really know it's stolen is by detecting when an improper contact is taking place - and it's hard to tell if it's really improper or not - or when there is some indication that others have the information (this requires an assumption). Since those who stole it will - obviously - pretend they didn't and will manipulate the data information wars become extraordinarily difficult. There can be multiple rulers existing simultaneously in the cyberbrain world, and their power is determined by the number of "keys" they have to access each network and by their ability to break through defensive barriers. The problem is the great number of code keys, or barrierbreaking ability, and the information processing power, not the size of the database. There's no use having a huge amount of information; if it's always being controlled, the network can still be cut off whenever desired, Ideally, one exerts the necessary controls at the necessary times, in a way that it won't be discovered. In order to be able to respond to changes in information, rather than concentrating it at one location it's also better to decentralize and redistribute it. That also means if there's an accident or disaster, damage will be kept to a minimum. In other words, the nervous system of a cyberbrain person is his or her own individual network.

Pa. 27 Regarding the antenna function of the brain: one thing people (or what might better be called "spirits") were originally capable of was a type of "channeling" that allowed them to synchronize with the external universe and make contact with the internal universe and with kiko energy, things easily understood as phenomena. For cyborgs whose bodies are almost completely machines, it's simple to put their sensory mechanisms in a sleep state, so when they run a "scientific" cyberbrain synch, they can easily enter a quasi-channeling state. (Maybe I'm the only one who thinks this way, but when people talk about the mentally disturbed or schizophrenic person hearing "broadcasts" or "voices." it might be related to this phenomenon.)

Pg. 36 Most types of artificial blood being considered are white in color; androids in recent science fiction have white blood. In my story, however, in view of the antenna-effect and magnetism influence, I've given my android red blood with an iron component. The liquid that the neurochips are soaking in, by the way, is neither red blood nor white blood but a nearly transparent, artificial spinal fluid. Blood products apparently ensert flow directly into the human brain due to the "blood-brain barrier," and I've heard this is a special mechanism to ensure that foreign substances in the blood never directly attack the brain.

Pg. 37 Regarding Batou's lines on page 36: Personally, I think all things in nature have "ghosts." This is a form of pantheism, and similar to ideas found in Shinto or among believers in the Manitou. Because of the complexity and function, and the physical constraints they have when they appear as a physical phenomenon, it may be impossible to scientifically prove this. There are, after all. humans who act more like robots than robots, and one cannot say for certain that they have no ghosts just because they don't act like it. In ancient times, neither air nor the universe were believed to exist. Just for reference, I should state that not all ghosts are the same in terms of complexity or effect.

Pg. 46 Japan currently has no "Ministry of Internal Affairs.". The police in Japan are headed by a state minister and a five-member National Public Safety Commission (including the prime minister). In Ghost in the Shall, politics aren't the main theme, so to make things less confusing, and because I like the way the British do things, I've created a Foreign Ministry and a Ministry of Internal Affairs. England has shadow cabinets, a term that has awfully negative underworld connotations in Japanese, so I don't like it, but I hope our opposition parties in Japan operate like that someday.

Government departments in Japan Pq. 50 generally start drawing up their rough budget requests for the next year in April. (It's another way of saying "gimme money.") The end of August is the Ministry of Finance's deadline. At the end of the year, the Ministry of Finance then presents a revised budget to the Cabinet and shows it to each ministry and agency. This is, in other words, the ministry's request to "hold the line at point x... " Upon accepting this, the head honchos, on up to vice ministers, at each ministry and agency start negotiating to try to restore whatever amount they can (with howls of protest and requests for a chance to explain further). Then the Minister of Finance presents the final draft to the Cabinet, and the Cabinet presents it to the diet, or (one hopes!) Parliament. In this story, however, the budget for Motoko's unit is part of a secret, "black" fund...

Pg. 57 Endorno is the brand name of a virtual-experience software designed for E-brain cyborgs. It allows several members of the same sex to share in the enjoyment of a sexual experience, on several lines simultaneously. ("Multi" refers to the experience of three people on one line). It's mainly illegal pornography that's experienced. There are obviously some harmful effects, but the stuff continues to be used in an underground network. Motoko Kusanagi has a particularly advanced prosthetic body, and for her it's a highly profitable side business. (P.S., it doesn't work on the opposite sex, for obvious reasons...)

Humans are said to have the following: pain points: 102–142 /cm; pressure points: 25/cm²; cold points: 636/cm²; warm points: 0–3/cm².

Pg.58 Batou's exclamation about drugs here occurs because he's synchronizing with major quantities of endorphins and other neuro drugs. It doesn't mean he's actually using the drugs. E-brain sex doesn't work in such a traditional way. It is possible to do a variety of creative things by further mastering the program, but in these drawings I unfortunately opted to depict easy-to-understand situations rather than the concept. The blue fluid depicted on the previous page is a program that amplifies sensation...

Pq.59 For safety reasons, and to prevent information leaks, all of them, including Major Kusanaqi, live in more than one place —in downtown apartments, suburban condos, company housing, and hotel rooms, etc. During their e-brain sex, they've turned off their connection to the outside network to thwart hackers from jamming the system. If someone has their e-brain key, however, they can still establish direct contact. Batous is

suffering because his brain is receiving sensory signals from an organ he doesn't even possess... Some people may be repelled by the thought of slugs fornicating, but there is an unusual carnal beauty involved which is worth looking into.

Pa. 60 The foreign minister's references to "E" ranking - "6 for need and 1 for difficulty" - is something I made up. (It's such an insulting way of putting it; normally, I'm sure the minister would just say they're a tiny country not worth worrying about.) The protrusions above and below the helicopter nose are wire cutters. Just to clarify: wire cutters are not a fancy new secret weapon. They've been around for some time and are used as a quard against power lines and the cruel booky traps often employed in urban warfare, the wires that are strung to stop jeeps by decapitating the drivers, or the helps that snarl props, causing a crash. Also, this is a nost-war scenario, and still fairly dangerous, so the VIPs have to be protected in a variety of ways, (Now, don't any of you readers go stringing wires to stop off-road bikes! It's dangerous, dammit! My brother-in-law was nearly killed by that.) I'm not sure what the minister means about Malles sending aid. It's a mystery.

Pg. 61 "0DA" refers to the Official Development Assistance, or Foreign Aid Ministry. (This is the problem agency, the one we wish would use our taxes more efficiently!) The foreign minister's comments about the 0DA are probably a better way of looking at the situation, rather than just thinking of it as an "invasion using economic power instead of weapons." As long as the 0DA fails to properly understand the countries it's supposed to be aiding, it will probably just be spinning its wheels. (Of curse, the recipient countries are also responsible for this lack of understanding.)

"Gavel" may sound like a weird name for a nation, but that's because it's more than a nation. One of the sub-themes of this story is that Gavel has taken on the name of a giant conglomerate or capital group. (About the ODA: since Japan did make a mess out of Asia in the past, and this is still having an effect on the area, it's probably best to regard the aid as a type of compensation for past exploitation... If one simply chooses to ignore Japan's efforts, that is.)

Pg. 64 The "pinhead" referred to is, as one might assume, the ability to hit the head of a pin 100% of the time. For a short-barreled gun, 100 yards is probably the limit. I think this shooter would almost have to be a genius, but I used this figure because I don't think it's completely impossible. Of course, it's important to remember that since she's a cyborg, one can almost completely ignore FRE (forearm recoil energy). Also, this score is obtained with a high muzzle-velocity gun that uses ultra-small-caliber ammunition. One of the selling points of the Seburo is that it doesn't jam, even when a cyborg's pulling the trigger, firing 12 rounds in three seconds...

Pq. 55 Revolvers don't need to be loaded one cartridge at a time; some have speed loaders wailable that allow loading six at a time. Some can be fired quite fast in training, but if your target runs to the left while you're loading, you may lose the opportunity to fire. Under normal conditions, you probably wouldn't be able to fire at all. I'm sure you understand why. The Seburo, however, is a gun with an extremely reliable extractor and bullets with clean neck lines, so it rarely jams. It's an example of high-precision engineering in a small firearm. The AST1 referred to is supposed to be a Chinese assault rifle based on a Korean model.

- Pg. 66 "AI" stands for artificial intelligence. This is a field of research in computer science that studies not just business-related information processing, but intelligent functions. I think of it as a knowledge/information processing device that is not human. That is artificial Experts hold a variety of opinions on this.
- Pa. 70 Contagious medical waste, or bio-hazardous garbage, is often poorly handled and will become a major problem in the future. Not only are the associated costs astronomical, but terrorists may start using some of the disease-carrying material. Finding a solution - create a huge, hightemperature incinerator and collection specialists: the parks and recreation can come later - should be given top priority by local governments. And hospitals: are they really sealing this stuff properly and giving it to the right parties? From what I hear. the volume isn't that great ... In the illustration. our senior citizen isn't being pecked by crows. probably because he's pickled in some sort of hazardous substance
- Pg. 77 After this kind of conversation with Togusa, Major Kusanagi probably thinks it was a mistake to have head-hunted him from police headquarters. She believes the ability to sniff out criminal activity by intuition cannot be acquired through training or experience. She calls this "ghost-whispering" and likens it to the abilities possessed by schizophrenics or channelers
- Pg. 87 In reality, might usually makes right, but there are those who, in reaction to this bleak reality, believe in the opposite ideal that might shouldn't make right. In trying to enforce their ideal, however, might or force often becomes necessary, thus showing how difficult it is to put ideals into practice. Also, in talking about what

- is right or just, whether with regard to groups or individuals, Muslim society or Christian society, etc., the different concepts of what is right lead each to view the other as evil. This makes the whole concept of right or wrong seem rather antiquated. If a consensus of the majority is all it takes to determine what is right, then having and controlling information becomes extraordinarily important.
- Pg. 98 A robot is a system this includes computers wherein a specific input, or performance. Some robots by themselves "can discriminate and perform multiple tasks to a certain extent." But robots are fundamentally different from androids. "Android" is a word that refers to the mecha that results when humans try to see if they can create humans using mechatronics. Conversely, it's a type of mecha that allows humans to mouth statements like, "humans are complex, but they are a system, so they can be replicated if only these components are put together in such and such a way."
- Pq. 99 Als with prosthetic bodies probably never experience hunger, sexual desire, the desire to sleep, or even the desire for glory and honor, unless programmed to do so. If they have any desire, it's probably to expand their network or create something or control something. In other words, to grow as an information system. This is something we may know in the near future, but have no way of determining now. I don't think here's an Al superior to a human in existence yet, but how should I know? I'm only a cartoonist! The definition of a human is developed, the question is: will humans really be able to recognize it?

Pg. 100 In looking at a book on brain death, it appears that whether a ghost attaches itself to a body or not is determined partly by the activities of the cerebrum and the lower part of the thalamus. Generally speaking, what we refer to as the "spirit" or "soul" is a very vague concept, including things programmed into, or closely related to, the physical body, such as memory, the results of chemical reactions and emotions etc.

Pg. 102 I'm sure there's really no need to note this, but the amount of micromachines in the solution, the amount of current applied, and the length of time, etc., are all — allowing for some error — determined by the class of micromachines. There are different types of micromachines — those that react to pressure, changes in temperature, pain — which is difficult — and they are mixed into the solution at a fixed rate. Changing the ratio of micromachines makes it possible to make a particular sense more delicate. Furthermore, for cyborgs employed in special types of labor, it's also possible to create special skin senses – such as the ability to detect

Pg. 105 These micromachines are a bio-type created using enzymes such as luciferase (what a fiendish-sounding name!), which is found among other things in the light-emitting organs of fireflies. (In reality, they're not black spots, of course.) Someone was supposed to have genetically engineered a Japanese killifish to produce luciferase. I wonder what happened to that idea?

Major Kusanagi is deliberately designed to look like a mass-production model so she won't be too conspicuous. In reality, her electrical and mechanical system is made of ultra-sophisticated materials unobtainable on the civilian market. If she appeared too expensive, she might be suddenly waylaid on a dark street some night, hacked up, and hauled off to be sold. "Custom models" here implies models with a prosthetic design created by a professional artist. For such cyborgs, an artist designs everything from the shape of the mechanical components to the external appearance. It is not unusual for designer-cyborgs to be over-stressed, or to have a variety of design imbalances, sometimes with grotesque results.

Pg. 107 16² indicates that the micromachines used for skin sensation are extremely tiny. Since obtaining these is an act of treason and thus is not available on the open market, this is something that Major Kusanagi has secretly obtained. It's clear that these women are manufacturing products of extremely high precision, but it's impossible to determine if the precision is the result of the 16². We can assume, however, that they are using micromachines even more advanced than those on the open market. The women, therefore, don't have to worry that someone will find out what they're doino.

Pg. 108 What do total cyborgs eat? I imagine that initially, cyborgs consumed small quantities of a paste-like substance or pills, but – partly for psychological reasons – by the time of this story, they are shown eating synthetic food such as shown here, with a "normal appearance and oral sensation," including taste. Fuchikomas, on the other hand, can last for two months by merely replenishing their tanks with a fluid mixed specially for neurochips. (Or let's assume so.) Fuchikomas aren't oure bio-robots, however.

Pg. 110 This is not an E-brain space or virtual reality, but a 3-D video room, Colonel Tonoda

is on a platform like a huge room-runner, the orientation of which is adjustable. He's surrounded by a dome-shaped room, with scenery simulated using a retinal-projection on the white, screen-like walls. Others would not see the view he does. Golf simulators using a similar, but much cruder principle exist today.

Pg. 117 "One life is more precious than all the stars in the heavens," or so the saying goes, but it's just a noble sentiment. In reality, a planet is worth far more than even a race of beings, including human, and thinking otherwise is a manifestation of the arrogant attitude we humans have that makes us ignore other life-forms. I hate the saying. I do have respect for human life, but I'm just trying to say that it's not as important as whole star.

Pg. 120 The activity of cells creates order, forming organisms, human bodies, and groups of individuals. Just as at each level, every one of these things has its own phase – if that's the right word – the phrase about the "world turning" refers to the overall speed of people's activities. This doesn't necessarily imply there is a larger, overriding conscious "world." Although they are of completely different scale, I use the words "god" and "spirit" in a similar way. Channellers are said to "speak with the will off the gods," but I don't think this means a human-like god speaks to the channeler. I think a special phase that we call "god" merely syncs with the channeler's linguistic field, physical functions, etc.

Pq. 121 In the future, perhaps such advanced, high-precision robots (almost all androids) would not really be discarded so easily. But only a few years ago, who would have believed that the office and audio/video equipment we now take for granted would become so common? Frankly, I doubt

that true humanoid robots will become so popular. If they were mass marketed, it would probably be with a leasing system, and there would be monthly inspections. Don't forget though, that nowadays when machinery's been used for five or six years, it's scrapped or sold cheaply to other countries. The same thing's true for consumer goods with AI functions built into them.

Pq. 123 Trichophyton and Claviceps are names of fungi. For those who want to know more, refer to W. D. Gray's The Relationship of Fungi to Human Affairs. There's no deep significance in using these names, but they were convenient for telling a story with lots of creepy elements. In order to keep up in the next century, Japan has got to develop micromachines and VLSI technology, and, to do that, sterilization and anti-fungi technologies will also be essential. Fungi applications and cyborgization, or using genetic engineering, will become an important theme.

Pg. 127 For readers who demand realism. I should note that a cyborg such as the Hanka president - a master-slave, dualistic heart-mind type - probably would not function properly or be able to exist unless it had simulated internal organ signals in a fairly realistic way. We humans are normally taught to distinguish between the body and the mind, but we shouldn't forget that the brain is part of a neural net that runs through the entire body, and thus, is part of the overall system. I read a report from somewhere about an experiment that indicated, "it is possible to mechanize part of the system [the human body], but when most of the end-terminals in the system are removed, output from the autonomic nervous system practically vanishes." In this story, I'm assuming that signals in artificial, prosthetic systems have been developed to a very high level.

Pg. 130 This is a trivial point, but rifle bullets, as we all know, are very fast, usually faster than sound, depending on distance, performance, and muzzle velocity, of course. As a result, I've deliberately avoided showing bullets strike after indicating the sound. Given the way I've drawn the rifle in this section, it wouldn't really matter, I suppose, but I did it anyway, which is a bad habit of mine. In this scene, Togusa was supposed to fire back two or three rounds and dash — with Batou covering him — which would have let the pair reach the bottom of the building faster.

Pq. 134 The man's words in panel 7 have no particular meaning. He's just trying to get Batou's attention, and while some people might understand him, the main thing he's trying to convey is hostility. Since it works, it may be a type of incantation. He's assumed that Batou and Togusa are police from the way Togusa yelled "Freeze'l" at his

Pg. 139 In movie scenes of special forces making indoor assaults, one often sees several people with guns drawn, charging down a hallway. They'd have to be really "special" forces to do so (ha-ha). In reality, they usually peek around a corner first and then, depending on the situation, make their move (like they did in C/5 and The Silence of the Lambs). In the old days, they probably used a dental mirror or something. The most important thing is to make sure you have the advantage before the enemy spots you and to not just start blasting away. The real firing should be done as support or when moving.

Pg. 140 Normally, I hate the sort of expository lines used in the second panel and try to avoid using them, but for Ghost in the Shell. I've forced

myself to make an exception. The name "Gosseyn" is taken from A. E. van Vogt's science-fiction novel The World of Null-A. Adam and Link are similarly inspired by Eando Binder's Adam Link — Robot. If the "ghost" is a "phase" or "phenomenon," I suppose during dubbing, the original could disappear and something different would be born in its place. Regarding the smuggling, there may be those who would say this wouldn't be necessary, that Hanka would be able to breed the kids themselves, but let's assume that the food, etc., is too expensive and they've therefore decided to use stolen goods.

Pg. 143 The boss is mistaken when he talks about the death penalty here. At the time of the story, it doesn't exist anymore, Personally, I think the death penalty should only be considered on a case-by-case basis and that it's not right to lump all those who commit crimes under the broad term of "criminals." I'm not a devotee of Hammurabi, but I do worry about giving too many advantages to the perpetrators of crimes. Perhaps people should be sentenced to "death by execution, with punishment delayed if activities benefiting society are earnestly pursued."

Pg. 144 Regarding fleeing the country, I remember seeing the following on the news once: a serial killer sentenced to death in the United States fled to and was captured in Canada, which has no death penalty. In Canada, the argument erupted as to whether it was constitutional to return the man to the U.S., knowing that he would probably be executed. Learning of this, several highly sadistic serial killers — some of whose victims' bodies had not been found – remarked that "truly civilized nations don't have the death penalty." I don't know the upshot of that particular

case, but clearly, civilized nations with great respect for human rights are beloved by criminals so vile they wouldn't even appear in a comic book. Whatever happened to "crime and punishment"?

Pg. 145 Regarding ordnance and equipment: in this scenario, it's being jointly managed and developed by multiple corporations. Individuals and units are simply not capable of handling the guns, prosthetic bodies, manufacturing parts requiring special materials, doing replacements and maintenance, and maintaining the equipment in the ultra-clean plants that are required.

Pg. 152 The gun has a catch, about two centimeters above the ejection port, that throws the cartridges forward, but for right-side ejection, it ought to be possible to design a little catch, nowhere near as big as a kicker, that would scatter them downward. (What? You don't think that's a good idea?)

Pg. 153 We won't go into detail here about the fact that a two-hour retroactive check was done later on Fuchikoma's external input record. No evidence of hacker break-in was found, but this in and of itself does not guarantee that none occurred; it merely means that operations continue, with an added element of uncertainty. I'm also not sure if an Al would really understand the concept of "profound" or not. It's used here to indicate that the information is given high priority when categorized.

Pg. 156 Methuselah is a name from the Bible and has the connotation of someone who's lived a very long time. It's not the Soviet woman's name. "Comrade" already sounds old-fashioned, but I decided to leave it in anyway.

Pg. 158 As far as the Northern Islands are concerned, it would be great if both the Japanese people who used to live there and the Soviets who live there now could somehow coexist. But when it comes down to an either/or situation, each side always claims historical precedent and nothing's ever resolved. Japan can assert its claim to the islands all it wants, but the assertion won't do any good as long as it's just a gesture. If only we could use all the energy expended on arguing on finding a new solution! Do we really need to defend our rights to the point of ignoring the entire Soviet Union? I know Gorby's in an unstable position and can't really develop a long-term strategy to solve the situation...but heck, the Soviets are taking too many fish in the area. (Editor's note: this commentary was written in 1989.)

Pg. 160 For the moment, forget that with anti-HERO measures implemented - "HERO," or Hazards of Electromagnetic Radiation to Ordnance, refers to the damage that EMF can cause to electromechanical components - both the helicopter and Fuchikoma would have been switched to manual mode, the attack barrier mode would have been activated to prevent cyberbrain backing and the main switches would also have been cut. Also, the Bertrave cityscape is comprised of skyscrapers two kilometers high, creating a disorienting sense of scale. For instance, 1,221 meters of Mt. Bertrave are completely blocked from view by the buildings. In the drawing on this page, the mountain is rendered at around 4.500 meters above sea level with the metropolis sprawling 11-12 kilometers out on either side. Or something like that.

Pg. 196 Yano's family was notified only that he had "died in training" or was merely "deceased." Families are never told the details or the truth of when, where, or how members die. At least this is better than learning about it years later, with the body somewhere unknown all that time. There are also times when deaths are reported prematurely, before a confirmation has been made, and the person is actually still alive. And, of course, there are times when death notices are sent out merely for strategic reasons.

Pq. 198 In distributed systems engineering, there's apparently no concept of "redundancy" in a group. To remove the old micromachines – let's say one has to inject "C" parts – reverse the adsorption, make them rotate, apply a centrifugal force of 5 x 10 dyne/cell to strip them off, and then suck them out with a magnet. (Given the blood-brain barrier, it's probably not a good idea to try to run them into the bloodstream and expel them that way.)

Pg. 205 Of course, in reality our pair would have been burned to a crisp and left without hair, clothes, or skin, but I don't show this because it would make things too confusing later on. To compensate, though, I've put an aquarium at the edge of the door, right next to the Major's boyfriend, and I've added a bathroom that's hidden by her. (I know it's normally supposed to be next to the door when you enter and that this still doesn't make un for it, but her's Use under

Pq. 207 Armored suit: A type of bulletresistant, fire-resistant suit, completely covering the body and consisting of an external shell of compound materials and four battery-powered limbs for locomotion that mimic human movements using master-slave technology. Although referred to by different names, some dangerous and impractical toys of a similar nature have been developed of late.

Pg. 212 This is a pretty classic way to avoid being tailed, but it probably wouldn't work for true pros. Normally, a 24-hour tail requires considerable manpower to prepare for all eventualities; it takes careful planning. If trains or buses are being used. shifts of people going in and out of the next three or four stations are needed. If cars are being used it requires people covering either side of the road on which the suspect is driving. In reality, of course, these operations rarely go by the book because it's impossible to prepare adequately, to get all the people required or the budget to support them. In theory, I suppose, true pros are supposed to get as close as possible to textbook situations. Using split-second judgment to station two or three henchmen is one way to get around some of these problems.

Pg. 223 "HV" refers to actual ultra-high performance, high-velocity armor-piercing shells. In this story, after FN manufactured advanced P90 weaponry, these shells were developed for handgurs and submachine guns. HV bullets are small caliber, providing low recoil and high penetration power, but they don't have very good stopping power against humans because they go right through them. Since these bullets are very effective against bulletproof vests, light armor, cyborgs, etc., in *Ghost in the Shell* they're fairly common but generally not available to civilians. The Seburo" firearms our heroes carry use HV shells. Armored weaponry, like the think-tank that appears tere, is necessary to go up against HV shells.

Pg. 226 Only a total cyborg can undertake this sort of high jump. If a partial cyborg with mechanical legs or limbs tried it, this would probably cause a rupture where flesh and machine parts are joined. Although a different level of analogy, it's sort of like the situation with artificial human bones of the Mg0-Ca0-Si0,P₂O₅ glass variety, currently very popular. This material is reportedly between four to seventeen times more elastic than human bone, but because concentrated stress creates a problem, physicians apparently use something closer to actual human bones for better overall balance. In real life, of course, cyborgs are apparently being developed, not with "superpowers," but artificial tissues that attempt a substitution for bioactive materials.

Pg. 237 Regarding Major Kusanagi's unnamed boyfriend, what looks like a bandage or a towel is actually a collagen seal designed to stop the bleeding. We'll pretend here that it's the same as an actual product currently being sold by Avitene Inc. in the United States. There is a book (available only in Japanese), published by Shogakukan on blood coagulants, titled Jintai no Shori, or "Victory for the Human Body," that lists for about \$60.00 (ack!) but has lots of photographs and is interesting reading.

Pg. 238 When traffic accidents are used to assassinate people, the assassinations are extremely hard to detect. Of course, sophisticated techniques are required to make sure the assassin is unhurt while the target is killed, but I won't list them here as it might be dangerous – I don't want anyone to try them out! The fact that assassinations are used in Ghost in the Shell means there has been a failure in the political process. It's like rape, I suppose. If you see one happening before your eyes, you're not going to be able to talk the rapist out of it. You'll probably have to use force to stop the perpetrator. Ideally, that should happen before, not after, the rape takes place. Sad, but true.

Pg. 241 In the hour and a half before the incident was reported, assume that a thorough attempt was made to detect operator input errors, but that it wasn't possible to turn the power off because of delivery schedules and the need to protect the robot body.

Pg. 243 The "soul" that Batou is referring to here represents a fairly simple collection of energy, a relatively low-level spiritual structure - what I would have referred to as a "low harmonic level" in Orion - as opposed to a true "ghost." which is the higher level spirit attached to human hodies "Manitou" and other "spirits" exist on an even more elevated plane and resemble what we call "gods" in the generic sense. The spirit world is infinite in its range, but from our perspective it includes everything from just below humans - from residual memories to simple insect and animal spirits - to way above humans (macrocosmic spirits at the limits of human imagination). Like human inner space, the spirit world is not vertically ordered in a hierarchy of control. Instead, the upper level is the sum of the activities of multiple sections. The same principle also applies. I suspect, to politics and ecosystems. Of course, if you select specific, individual levels to examine independently, then the entire structure appears to have a masterslave/top-down control aspect to it, but one suspects that the act of selection itself is what yields the materialistic conclusions to which people often come. If concentrated thought creates matter, molecules, chemical compounds, cells, organisms, and systems, then there is also a mode at each level of the hierarchy capable of bundling it all together.

Pg. 247 In this story, people of Willis' generation are often not directly linked with cyberbrains because they don't want their own brains fiddled

with by cyberbrain doctors young enough to be their children. But since this also limits their dealings with the world, they try to bridge the gap through cyboroization. Willis is a good example.

Pg. 254 It gets harder to tail in the rain because of decreased visibility, but optical camouflage becomes easier to detect (especially when moving at high speeds). Opto-cam tailing is a trademark of S-9. Batou is following two cars behind the target car.

Pg. 268 Cyberbrain space and cyberspace are often depicted as glowing, three-dimensional graphs. This is an easy-to-understand representation, but I think cyberbrain space consists of something far more conceptual, something beyond and unrelated to our visual and audio senses. Of course, it's all right to use audiovisual representations, but the conversion seems inefficient and ultimately meaningless. After all, there is no form or sound in the cyberbrain world. And besides, we're talking about something that doesn't even exist yet - virtual reality still relies on the five human senses for its replication and thus isn't a true cyberspace - so this is all really meaningless speculation. Still, it's fun to imagine what it would be like

Pg. 269 For those wanting to know more about saccades, etc., rather than a book specifically on biology, I recommend an interesting work titled Sensors and the Eyes of Living Things, edited by Kajuro Shimizu and published by the Information Survey Association, 1985. This book – which I've recommended before – describes not how we see things with our eyes, but how we "see" light information that comes through our eyes with our brains. (Note: this book is presently only available in Japanese.)

Pg. 271 I drew the final panel the way I did just to make it easier to understand. The core memory is by no means the core of the Puppeteer; he is the total system itself. Generally speaking, when we refer to specific "individuals," we're not referring to their brains, but to their entire body. A "ghost" in this case refers to the state of the entire body-system (it might even be called a "phase") and not to a bundle of energy in the object called a "brain," although it may be a place created by energy, the "self" that the Puppeteer refers to is an integration of information that has reached a specific level of complexity, shifted, and created a nbase called "life"

Pg. 273 According to some psychics, depending on the situation, even the spirit that we think of as the "self" in "phase" of the system, perhaps?), may actually change mode, from thought or physical self, to a level where it is being influenced or controlled by a guardian deity, a protectorate spirit, or an original spirit, etc. If we're talking about infinite free holons in both lower and upper levels, then inner space and outer space continue ad infinitum. Shinto also considers things in terms of three stages – the ikumusubi or conscious self, the tarumusubi or unconscious self, and the tamazumemusubi or the self that transcends self.

Pg. 274 Just as one cannot see the layout of the entire vascular system with a micro-endoscope floating in the middle of a capillary, Major Kusanagi is unable to see the exact image drawn in these panels. She would only be able to see it if she had a map of the entire system sent to her from an observational "satellite," or external source. It's sort of like the game where you put your hand in a box with a maze and with your eyes closed try to imagine what it looks like, or the way that in a dram you don't know

the exact location of all the roads or buildings in a scene; at least most people don't. In a cyberbrain network, distance and specific locations can almost be ignored, especially when the hardware is wired. The more I try to visualize it, the more this type of depiction loses meaning, I suppose.

Pq. 275 Some readers may think that Aramaki should first use Batou and then call for outside help instead of the other way around. For the sake of clarity, let me explain. I thought that if Major Kusanagi were in trouble, and Batou did a brain dive using the same method and technology and barrier, especially since he'd be using his own barrier this time, he'd only run into the same problem. In this story, the winners and losers are not determined by guts and passion but on a digital level by the "system" and the voltage. There's no real struggle or contest; a split-second flow determines the winner.

Pg. 277 In this case, the electrons and the magnetic force that Major Kusnangi is referring to have the same relationship as patterns and backgrounds do. I realize that Kusanagi's bit about "electron traces" is a little unclear, but it's just her way of saving it.

Pq. 279 The Puppeteer has discovered that at each tier, the relationship between quanta creates a phase. This is also a discovery of self. "The self as part of the whole" used to consist of a relationship such as "the complex structure of natural things + a part of nature," but now, phases such as society, corporations, and the state are also powerful. Most religions have anthropomorphized the upper level of the system they believe in, and thus think of it as a sort of lord over the decision-making process, but like the relationship between the mind and the body, this is not really a higher-level

control. It should be thought of as a phase (mode) of the totality.

Pg. 283 What do you think are the top three events in history? In the context of the story, Major Kusanagi is thinking of the discovery of fire, electronics, or electricity, and the creation of life. I realize these are kind of vague! I know that some people would probably list the wheel, computers, nuclear energy, or writing, language, or death, which is a big one. All are important. In my way of thinking, fire differentiated man from apes, and electronics includes information processing by computers. I can understand why some people would leave out physical tools, but not including language and writing systems (and symbols), and especially death? Well...

Pg. 284 The fact that I have a lot of religious references in my comics recently - Orion is another example - has nothing to do with the popularity of new religions in Japan, I include the reference because I think that as society ages and enters an era where high-tech and philosophical problems are increasingly intertwined - issues regarding brain death and the environment - organized religion is one of our biggest obstacles. At the start of the twenty-first century, around the time a savior is prophesied to return. I believe the fusion of science and religion is going to be one of the most critical issues facing us. Religion will have a huge role in issues of abortion, blood transfusions, bio-meat for consumption, and the use of fetuses and the dead for bio parts.

Pg. 286 Kusanagi's skull is made with a titanium shell, and she has a large number of prosthetic enhancements, so she really does

have to worry about sinking. But not all cyborgs sink — some models are designed to float with special foam-based materials.

Pg. 288 Y-3 does not refer to a submarine but to a cyborg in the *shape* of one, covered with muscle tissue on both sides, extending back to a tail.

Pg_ 293 Gertex is a coined term. It's a Czechmanufactured plastic explosive (PE), second in popularity only to Semtex. A real headache for security, it can't be detected by sensors at airports, yet only ten ounces of it can blow a 747 to smithereens. Gertex does not exist in the real world.

Pg. 297 Use of strategic, nuclear weapons is referred to as "H. (high) I.C.," traditional warfare is referred to as "M. (middle) I.C.," and conflicts involving low levels of destruction are referred to as being "L.I.C."

There are examples of this type of exchange in the British Parliament, but in Japan, with its shadowy back-room politics, it seems highly improbable.

Pg. 300 If you're confused, this is Kusanai's Section One boyfriend from chapter eight.

Pg. 303 MOSSAD is the world-famous Israeli intelligence agency which – in the era of this story – has gone a little soft.

Pg. 314 Japan used to have a jury system, but it was suspended, not abolished, in 1943. November 1, 1990 is the one-hundredth anniversary of Japan's modern judicial system. In recent years, there has been a movement to reconsider the use of jury trials and other forms of citizen participation in the legal system.

Pg. 329 Kusanagi and Batou's car is obviously not from Public Security's vehicle department. Nor is it one of many they've hidden throughout the city. They're simply driving a stolen car. They've removed the plates and replaced them with their own, and these plates are forged versions of VIP numbers that they've researched. It's one of young Batou's clever little ideas. He figures that if any problems occur, rill at least make the authorities hesitate hefore responding.

Pq. 332 Major Kusanagi is worried about the vehicles in panel three because she can't imagine multiple thieves breaking into such a large facility and carrying off everything they steal on foot. In addition to the three dead thieves, she thinks someone else must have fled in a vehicle. Of course, there's always the possibility that there were only three thieves who came on foot and really did plan to carry out the loot, but since they're dead, she deasn't have to worry about that situation.

Pg. 333 Panels four and five show a screwactivated switch, the type used in bomb casings. But in this era, the system is electronically activated with only a half-turn because shapememory alloy wire is used. As a result, the easiest way to dispose of bombs is to cover them with a titanium shell and blow them up.

Pg. 334 It's not clear in this story whether the actual metal body was corroded when the mold tatacked the aluminum alloy coating, but when Batou sees the mold-covered mechanism he says, "Mold?! On an aluminum compound?!" Given the setting, it may be the result of a micromachine — in this case a microcrobial robot — weapon, but I for one certainly hope that such a weapon is never manufactured. (How irresponsible of me to believe this virthout basis.) Pg. 336 In panel five, Batou is not trying to hide in a locker. He's entered a secret passageway through an opening disguised as a locker. In reality, there's a huge duct right under the locker, so they've really just carved a hole in the duct and closed and locked off the other entrances.

Pa. 338 Concerning the fissioning pyramid indicated with protons (vangerons); this is a diagram of a system, so it ignores the actual numbers at each different level. As with powers of ten, in terms of size, the progression would be Imicroscopic constructions → human size → heavenly body size), but in terms of structural complexity it would instead be [microscopic constructions → heavenly body size → human size], which is also the order in which they were actually created. In this sense, in the third panel on the next page the more one enters the middle region, the newer and more complex the system becomes. Please view it as being in the realm of "human size." In other words, from the level of complexity, it's inevitable that the micro and macro worlds resemble each other

Pq. 339 I've read somewhere that in the very distant future, after 10¹⁰⁷ seconds have elapsed, the material universe will become an extremely rarefied—and when I say "rarefied" here I mean really rarefied!—gas of electrons, positrons, and photons and will stabilize. With this kind of universe, it's hard not to start imagining such implausible things as the eternalness of God or spiritual trips unhindered by the speed of light.

Pg. 342 I'm sure everyone is aware of the theory of the void-like nature of the galaxy, but the idea of a rotating universe is probably a product of my own vivid imagination. My reference to "moment" may be a completely inappropriate and silly analogy,

but who knows what time is really like, anyway? In the second panel, in terms of a signal, I think that complete homogeneity would represent death. True randomness is something machines are actually better at than humans, so a "biased-randomness" in and of itself may be a characteristic of life.

Pg. 343 For an interesting definition of life, I recommend von Neumann's ideas as described in "An Information Theory Definition of Life" in chapter 11 of the book by William Poundstone titled The Recursive Universe: Cosmic Complexity and the Limits of Scientific Knowledge Contemporary Books, Inc., It has descriptions of everything from dead bodies to clones, but - what the heck - I wouldn't know how to classify an old man with dementia who's finished his genetic replication. Unless somebody can define holons it seems to me that organ transplants will make this problem spiritually impossible to resolve. But if self-replication can be considered a life-form then intelligence should be, too. The real problem is that "life" is a such an unscientific word.

Pg. 344 The "altered-species/glider" that the Puppeteer is referring to probably includes the slack and "play" that he would gain as a result of incorporating Kusanagi. "Glider" has no specific meaning here...! know it's not ideal for this situation.

FUTHOR BIOGRAPHY

SHIROW MASAMIINE

Shirow Masamune was born in Japan on Nov. 23. 1961. Shirow studied drawing and oil painting at the Usaka University of Art, and while there, he wrote and drew his first published comic. Black Magic, for fanzina Atlas

After graduating, Shirow taught high-school art. During those years, he created Appleseed, the first volume of which was published in 1985 by Seishinsha, Dominion followed in 1986, That

same year Annieseed won the Galaxy Award - equivalent to the U.S. Hugo - for best science-fiction comic Shirow continued to release volumes of Appleseed at regular intervals until the publication of the fourth volume in 1989

After assisting in the direction and character design of the Black Magic M-66 animation video. Shirow began work on Ghost in the Shell. The first episode appeared in 1990. in Kodansha's Young Magazine. About this time, Dominion was made into an extremely successful

animated video series, now available in English.

After writing and drawing several new episodes of Appleseed. Shirow decided to take a hiatus from producing the series he considers his "life's work." He had also been working for Fujimi Publishing on the Neurohard series, a "bible for a shared world" which, when complete, will serve as a blueprint other creators can follow to make animation, games, comics, etc., based on the world Shirow has created. In 1995, Shirow released Dominion: Conflict 1

November of 1995 featured not only the release of the feature-film version of Ghost in the Shell. directed by Mamoru Oshii, but the initial chanter of the Shirow's Ghost in the Shell sequel, Man-Machine Interface. When finally collected in 2001, Shirow had completely re-imagined the original work, adding over 100 pages of stunning color art, utilizing state-of-the-art digital imaging unlike

> anything seen before in a work of graphic fiction. The Ghost in the Shell franchise again expanded in 2002 with the acclaimed animated TV series. Stand Alone Complex, and 2004 saw not only the release of another spectacular Ghost in

the Shell animated

feature, Innocence (again directed by Maroru Oshii), but a second adaptation of Appleseed, Japan's first full-length CGI film, directed by Shinii Aramaki.

Over the years. Shirow has produced a vast body of design and illustration work, much of this material being collected in the angoing Intron Denot series of art books.

An extremely private individual - "Shirow Masamune" is a pseudonym - Shirow lives and works in Hyogo, Japan, following the loss of his house in the 1995 Kobe earthquake, enjoys reading, and keeps numerous spiders as pets.

攻殼機動隊

Deep into the 21st century, the line between man and machine has been inexorably blurred as humans rely on the enhancement of mechanical implants and robots are upgraded with human tissue. In this rapidly converging landscape, cyborg super-agent Major Motoko Kusanagi is charged to track down the craftiest and most dangerous terrorists and cybercriminals, including "ghost hackers," capable of exploiting the human/machine interface by re-programming human minds to become puppets to carry out their criminal ends. When Major Kusanagi tracks the cybertrail of one such master hacker, the Puppeteer, her quest leads her into a world beyond information and technology where the very nature of consciousness and the human soul are turned upsidedown and inside-out.

From Shirow Masamune, the award-winning creator of Appleseed and Dominion, comes Ghost in the Shell, the breakthrough manga that inspired the internationally acclaimed animated film, and now restored in this new edition to its original collected format — and more adult treatment — as published in Japan. An epic dystopian tale of politics, technology, and metaphysics, Ghost in the Shell has been hailed worldwide as a unparalleled visionary work of graphic fiction, now ready to dazzle the imaginations of its second millennium.







